Math 120A - Spring 2004
Mid-Term Exam Number One
April 22, 2004

Name: _____   Section: _____

1	10	
2	10	
3	10	
4	10	
Total	40	

- Complete all questions.

- You may use a calculator during this examination. Other calculating devices are not allowed.

- If you use a trial-and-error or guess-and-check method, or read a numerical solution from a graph on your calculator when an algebraic method is available, you will not receive full credit.

- You may use one hand-written 8.5 by 11 inch page of notes.

- Show all work for full credit.

- You have 50 minutes to complete the exam.

.

1. A train runs along a straight track from the city of Springfield to the city of Alberta. Alberta is located 40 miles south and 35 miles east of Springfield.

   (a) The tiny nation of Circlvania is an 18 mile radius circle centered 20 miles south of Springfield. For what distance of the train's trip will the train be in Circlvania?

   (b) How close does the train get to the center of Circlvania?

2. A farmer wants to make a rectangular enclosure with 220 meters of fencing. One side of the rectangle is bounded by a river, so no fencing is needed on that side of the rectangle. Also, she wants to use some fencing to split the enclosure into two compartments as shown in the figure.

What dimensions should she use for the enclosure to get the maximum possible area?

RIVER
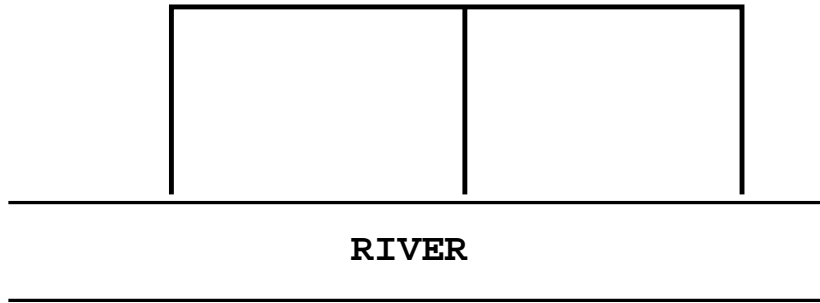
3. Let $f(x) = 5x^2 - 1$.

    (a) Find the expression for
$$\frac{f(x+h) - f(x)}{h}$$
    and simplify as much as possible.

    (b) Let $g(x) = x + 2$. Find all solutions to the equation $g(f(x)) = f(g(x))$.

4. Pizzeria Stairsteppo makes a pizza shaped as shown below. Alice wants only a portion of the pizza and does so by making a vertical cut through the pizza and taking the shaded portion. Let x be the bottom length of Alice's portion and y be the length of the cut as shown in the figure.
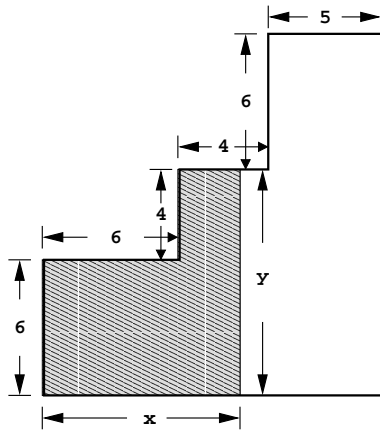
(a) Find a formula for y as a multipart function of x, for $0 \le x \le 15$.

(b) Find a formula for the area of Alice's portion as a multipart function of x, for $0 \le x \le 15$.